SR 169 - II
ROUTE DEVELOPMENT PLAN
MILE POST 22.97 - 25.26

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DISTRICT 1

BELLEVUE, WASHINGTON

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EXECUTIVE SUMMARY

SR 169 traverses Maple Valley, one of the fastest growing areas in King County. Because of its location it is the primary artery for the region. If future development and growth continues as expected, SR 169 will become increasingly more important. Ideally a route in this strategic location would be a limited access parkway. As such it would be an aesthetic asset and traffic facilitator for an area that possesses much natural beauty. However, because of fiscal restraints, this plan recommends the eventual development of a six lane highway with curbs, a median interrupted by left turn pockets and channelization where appropriate.

The number of lanes was determined by deriving a growth factor based on recent trends, a review of surrounding community plans and the King County Transportation Plan. For forecasting purposes, this growth factor was assumed to be 3% compounded annually with 2010 as the target year. The projected ADT for the northern end of SR 169 computes at 57,100 vehicles per day. Because of topography, the location of traffic generators and the road network, little displacement to other corridors is likely.

SR 169 has been divided into two sectors for Route Development Plans. This is the northern section (segment 2) and it extends from 140th Way SE (MP 22.96) to I-405 (MP 25.26). Since it is the closest segment of SR 169 to Renton, Bellevue and Seattle, it is the most critical section at this time.

Two additional recommendations are also proposed. We believe that this section of SR 169 should be indicated:

1) As a principal arterial on the functional classification plan and
2) For access managed control on the State's Master Plan for limited access highways.

ROUTE DEVELOPMENT PLAN

Introduction

A Route Development Plan is intended to identify the future improvements needed for a designated section of State Highway to provide necessary capacity at a future date, usually 20 years hence. This plan encompasses many factors synthesized into a recommended highway design. When approved, this long range plan will provide guidance for the prioritization of the District's future projects as well as direction for the Developer Group's determination of impact mitigation measures for proposed developments.

Background

This study of SR 169 section II is part of the Washington State Department of Transportation (WSDOT) District 1 long range Route Development Planning Program. The study encompasses the section of SR 169 between 140th Way SE and I-405 in Renton (Mile Post 22.96 -25.26). In this area, SR 169 is known as the Maple Valley Highway. The WSDOT Level of Development Plan indicates that this section be developed to design standards while the functional classification is a minor arterial.

Presently there is one project programmed for this section in the 6 year program. It is a $4.6 million project that would construct 4 lanes on a new alignment and a new bridge over the Cedar River. The bid advertisement is scheduled for January 1991.

This section of SR 169 is situated in a valley that is rapidly changing from a rural and natural area to a suburban environment. It lies approximately on the boundaries of two community planning areas, namely Newcastle to the north and Soos Creek to the south. SR 169 is the main artery for Maple Valley and the adjoining hillsides and is the most direct route from Renton to Enumclaw. As indicated earlier, there has been rapid residential growth in the area and pressure for more growth is evident.

TYPICAL ROADWAY SECTION

Number of Lanes Based on Design L.O.S.

Design standards indicate that minor arterials carrying more than 700 vehicles per design hour are justified as a multilane roadway. In this respect, this section of SR 169 (Section II) would conform to M1 or M-5 Design Standards. Presently the 1987 WSDOT Traffic Report indicates annual average daily traffic (ADT) volumes of 29,800 vehicles on SR 169 east of the I-405 ramps (MP 25.18). Special counts in June of 1987 indicated daily volumes of 32,770 on a Tuesday and 33,470 on Wednesday of that month. Directional peak hour volumes for those days ranged from 1,320 to 1,410 on the eastbound segment and from 1660 to 1730 on the westbound segment. For the section of the road developed with 5 lanes including a 2 way left turn lane, the level of service is "C" at the present time.

Traffic on SR 169 in this area has grown significantly in the recent past. While counts are available for only the past three years at the point east of the I-405 ramps (MP 25.18), the growth has been 7.4% per year. At SR 169 and 149th Place SE (MP 22.29) just east of the study section the growth in ADT has gone from 10,300 to 16,900, a growth of 9.2% per annum in the last six years (1980 - 1986).

To determine a base figure for establishing a design hour volume (DHV) the ADT volume (29,800) in the WSDOT Traffic Report was used. From the 29,800 ADT a peak hour number of 1,630 was arrived at using K factor of .08, a PHF of .95 and a directional split of 65/35. This number matched well against the actual peak hour counts taken during the year, and falls within the range indicated by the actual counts.

To secure a DHV the base figure of 1,630 was factored by a projected growth of 3% compounded annually. The 3% was arrived at by building an area model based on projected land development, zoning limitations, relevant comprehensive plans and the King County Transportation Plan. The 3% represents a slow down of present growth rates in the area.

The resultant DHV is 3,220. Matched against a lane capacity of 1,433 the V/C ratio for the present five lane section would be 1.12 or a level of service F in 2010. Since LOS "F" is unacceptable for planning purposes, six lanes with left turn pockets are recommended for SR 169, Section 2. At 2010 the LOS for six lanes would be near E (V/C ratio of .75 while .76 is E). It is important to note that LOS F would not likely occur till the end of the planning period (2010) and that five lanes may provide necessary capacity for several years to come.

Right of Way Width

The right of way varies between 100 and 140 feet at this time. To accommodate six lanes, sidewalks and necessary channelization, a minimum of 120 feet is required. Part of the increased right of way could come from the Burlington Northern Railroad right of way which is located immediately adjacent to SR 169 for much of its length.

Lane & Shoulder Width

The proposed roadway would consist of two-outside lanes of 13.5 feet each, four interior lanes of 12 feet each and a median of 13 feet. A shy distance of 3 feet would be provided. One and a half foot would be provided by the gutter and one and a half foot would come from the outside lane. A three foot shy distance is called for in the Design Manual when bicycles will be using the roadway. No shoulders would be provided with curbs and gutters. At selected intersections the median would be utilized for left turn pockets. (See attached cross section.)

Curb, Gutter and Sidewalk

The western end of the Cedar River Valley is rapidly developing into a suburban-type area. Reflecting this trend, curbs have been built along SR 169 from I-405 to the western edge of the Maplewood Golf Course. For much of this distance, sidewalks also exist. Because of the topography and developmental pattern in this area, SR 169 is the only practical pedestrian route between the valley and the center of Renton. Therefore, whenever SR 169 is expanded in this area, provisions should be made for curbs and sidewalks.

Level Of Access Control

Desirably SR 169 should be a freeway through Maple Valley since it is the major (and only radial) thoroughfare serving this large valley which is now the target of development pressure moving out from Renton. No access control, existing or planned, is noted on the 1988 Master Plan for Limited Access Highways. Nevertheless, access managed control should be established to guarantee the route's capabilities to handle traffic safely and expeditiously. A high degree of access control is possible, because of the position of the railroad's property, existing development (e.g., golf course and parks), low density zoning and subdivision review. A median strip interrupted only at major intersections will greatly reduce access as well. Presently, the State and County have a Letter of Understanding establishing an Access Management Plan. Thus, while it is not practical to designate this as a completely limited access facility, a designation of access managed control, can restrict access to a meaningful degree on SR 169.

INTERCHANGES

No interchanges are planned for SR 169 Section II other than exists at the junction with I-405. The intersection with 140th Place SE could be a point of congestion, despite channelization and signals. That location is the only one where a heavily traveled road meets SR 169 in this section. This intersection will be handled in more detail in the report for SR 169 Section 1.

INTERSECTIONS

Conceptual Channelization Plan

In this relatively short section of SR 169, there are few intersecting streets. Only three are listed on the King County Transportation Plan as arterials. These are 140th Place SE, 131st Avenue SE and Maplewood Golf Course Road. All of these are "T" intersections which are much less complicated than typical 4-legged types. Because of the heavy volumes on SR 169, channelization will be required to reduce impedance caused by turning movements. The following table indicates where future channelization will likely be needed:

TABLE 1

POTENTIAL CHANNELIZATION

Location	MP	Rt. Turn	Left Turn
140th P1. SE	22.96	EB to SB	--
131st Ave. SE	23.37	EB to SB	--
Maplewood Ave. SE	23.86	WB to NB	EB to NB
I-405 Interchange	2S.18	EB to NB	EB to SB

These locations were selected from an examination of available data and judgments regarding future growth patterns and trends.

Between the intersection of SR 169 and 140th Place SE and the I-405 ramps, left turn pockets should be provided in the proposed median to serve any intersecting street.

Signalization

Four locations are presently signalized. These are at the I-405 ramp junctures, 131 Avenue SE, Park Place entrance and the intersection with 140th Way SE. No other location appears on the District 1 Signal Priority List which ranks the most critical 250 locations. Ideally signals should be no closer than one quarter mile on SR 169.

ROADWAY CHARACTERISTICS

Design Speed

The setting of SR 169 in this area is rather unique. The general area will fully developed as a suburban area in the future. Because of its relationship to the golf course, river, other natural features and the abandoned railroad right of way, some control of access will be possible. This would tend to justify a higher design speed. However, the very features that make the highway unique also create a situation that limit the pedestrian access to the Valley to the roadway since it is the only route from the Valley to Renton proper. This pedestrian access is provided by sidewalks flanking the existing section between the golf course and I-405. Curbs are also established for the entire length of this highway easement and are proposed for the 4 lane project scheduled to the east of the Maplewood Golf Course. To protect these pedestrians and create a better environment the design speed should be established at 40 MPH. This would coincide with the present posted speed limit for much of the section.

Accident History

From 1983 through 1986, 167 accidents occurred on this stretch of SR 169. The following table compares the subject SR 169 segment accidents and injuries with the average state rates for these years.

TABLE 2

ACCIDENT INFORMATION

ACCIDENTS

	1983	1984	1985	1986
NUMBER	27	37	48	55
SR 169 RATE	1.47	1.31	2.31	2.28
STATE RATE*	1.6	1.8	1.9	1.7

* Number of accidents per million vehicles miles of travel

INJURIES

	1983	1984	1985	1986
NUMBER	17	32	23	32
SR 169 RATE	0.93	1.62	1.11	1.33
STATE RATE*	1.0	1.1	1.1	1.1

* Number of injuries per million vehicle miles of travel

FATALITIES

NUMBER	O	O	O	2

The table reveals that accident rates began to exceed the state rate in 1985 but injury rates are near or under the state rates. Since two fatalities are statistically insignificant, no comparison was made with the state rate. Both fatal accidents took place in 1986, one involving a sideswipe and the other a left turn collision at an intersection. Both occurred one half mile apart in the vicinity of the Maplewood Golf Course. From the information available it appears that no identifiable road conditions were instrumental in causing the accidents.

A review of the various types of accidents shows that rear end accidents were the most frequent (77). Angle collisions accounted for 40, while left turn movements involved 27. Those three types accounted for 144 of the 167 occurrences. The specific location with the highest number of accidents was at 140th Place SE where 28 occurred. Nineteen (19) of these were rear end collisions. Two stretches, one along the golf course (between 131st NE SE and Maplewood Avenue) and the other near the sweeping curve (between 5th Avenue SE and Blaine Drive) had 33 and 31 accidents respectively during the four year period. The stretch near the golf course has only two lanes; however, it is to be realigned and widened. The section with the sweeping curve had numerous accidents involving vehicles entering the roadway from the abutting driveways. The accident rate should decrease when the road is improved in the future years. This is because head-on accidents would be eliminated by the construction of the median and the resulting reduction in left turns.

[NOTE: A review of 1987 accident statistics revealed a decrease in the accident rate to 1.94 and one fatality for this section of SR 169.]

Sight-Distance Restrictions

One location exists where there is a horizontal sight-distance problem. This is caused by the undercrossing of the railroad tracks 1370 feet west of the Cedar River (MP 23.37). Although the undercrossing. produces a sight-distance problem, only four accidents have occurred at this location in four years. With the relocation of the roadway and the elimination of the undercrossing, the problem will be eliminated.

HOV Treatment

Traffic conditions and land use densities do not suggest a sufficient demand for HOV lanes at this time. However, it is likely in the future that certain measures will be required to facilitate movement, especially in the westbound direction. This treatment may be necessary because of the large backups from vehicles accessing I-405. Such treatment could consist of queue bypass lanes or use of the fifth and sixth lanes exclusively by HOVs.

Ideally, a comprehensive regional plan for HOV measures should be adopted. Until such time, decisions for designating HOV lanes on roads such as SR 169 will depend on an analysis of need during the design report preparation stage.

BRIDGES AND STRUCTURES

There are three bridges on this section of SR 169, not counting the structures at the interchange of I-405. The first bridge crosses the Cedar River one quarter of a mile west of the 140th Place SE intersection. This bridge is scheduled to be replaced by a new bridge in 1991. The second structure is the railroad underpass discussed above and the other structure is a "half" bridge just west of the intersection with SE 5th St. where SR 169 is cantilevered over the Cedar River for 538 feet. The railroad undercrossing will be eliminated as part of the project to realign SR 169 in 1991.

A review of the accident data for the years 1983-86 reveals that relatively few accidents have occurred at these structures. In addition to the accidents noted at the RR undercrossing, two accidents have taken place on the Cedar River bridge in four years. All bridges in this section of SR 169 have a life expectancy of at least 35 years.

MISCELLANEOUS

Pedestrian Facilities

A pedestrian trail parallel to SR 169 is a feature of the King County Transportation Plan. The trail site is proposed on the abandoned Burlington Northern right of way. Along SR 169 there are sidewalks for most of the distance between the golf course and I-405. For the realignment project of SR 169 between mileposts 22.50 - 23.90, sidewalks are scheduled on the south side of the new roadway between SE 131st Street and the western terminal.

It is likely that sidewalks will always be needed along the entire route. Therefore, any expansion of SR 169 should include sidewalks in the project.

Bike Path/Lanes

The Washington Bike Map indicates that SR 169 is approved for bicycling its entire length. The county also plans to add a bicycle trail to the Burlington Northern right of way which parallels SR 169. Where curb, gutter, and sidewalk is present, shy distances should be provided. This shy distance is to accommodate bicyclists even though a separate facility may be nearby. Experience indicates that separated facilities do not always provide for the needs of bicycle commuters because of indirectness of route or congestion caused by recreational users.

Bus Pullouts

Presently Metro operates commuter oriented bus service along SR 169 between Renton and Enumclaw. Bus stops are provided on-street where there are curbs. Because of the bordering hills, the Cedar River and the narrow valley, development in this section of SR 169 will not be intense if current zoning patterns prevail. Therefore, few additional bus pullouts or stops will be likely in the future.

Land Developer Participation

Anyone developing land adjacent to a State Highway is expected to mitigate any impacts they would impose on that highway. Development will continue to grow. As the main transportation route in the valley, the safety and capacity of the roadway should be protected. This can be done by utilizing channelization, signalization or TSM measures where appropriate. It is essential to strategically locate such signals to maintain proper signal progression in a specific geographic area. Where right of way widths are less than desired, additional width will be requested from developers. Specific mitigation measures should be identified after a review and analysis of a given situation using the procedure defined by the WSDOT Developer Policy.

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